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Facilities Handbook for Spacecraft Assembly and Encapsulation Facility Number 2

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FACILITIES HANDBOOK
FOR
SPACECRAFT ASSEMBLY
AND
ENCAPSULATION FACILITY
NUMBER 2

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LIST OF ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this handbook. A more comprehensive listing is contained in NASA Reference Publication 1059 Revised, Space Transportation System and Associated Payloads: Glossary, Acronyms, and Abbreviations.

A	ampere
ac	alternating current
ACM	access control monitor
AE, AM, & AO	building(s) on CCAFS
°C	degrees Celsius
CCAFS	Cape Canaveral Air Force Station
CCTV	closed circuit television
cfm	cubic feet per minute
cm	centimeter
CWA	clean work area
EPD	emergency procedures document
ESS	electronic surveillance system
°F	degrees Fahrenheit
f-c	foot-candle
ft	foot
gal	gallon
GHz	gigahertz
GN ₂	gaseous nitrogen
HAD	heat activated detectors
HEPA	high efficiency particle air (filter)
hp	horsepower
HPF	hazardous processing facility
Hz	Hertz
in	inch
IRIG	Interrange Instrumentation Group
kg	kilogram
KSC	John F. Kennedy Space Center
L	liter
lb	pound
LC	launch complex
lm	lumen
LPS	Launch Processing System
LSSM	Launch Site Support Manager

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LIST OF ABBREVIATIONS AND ACRONYMS (continued)

m	meter
MHz	megahertz
min	minute
NASA	National Aeronautics and Space Administration
OISD	Operational Intercommunications System Digital
OMI	Operational Maintenance Instruction
PA	public address
PACS	Payload Access Control System
PETS	Payload Environmental Transportation System
PGOC	Payload Ground Operations Contract
PPF	payload processing facility
psig	pounds per square inch gage
RF	radio frequency
SAA	satellite accumulation area
SAEF	Spacecraft Assembly and Encapsulation Facility
scfm	standard cubic feet per minute
sec	second
SID	Standard Interface Document
V	volt
VPF	Vertical Processing Facility
WBTS	Wideband Transmission System
%	percent

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FOREWORD

Launch site payload processing facilities are described in three levels of documentation. These levels and their purposes are:

- a. K-STSM-14.1, Launch Site Accommodations Handbook for Payloads - This document provides a brief summary of each facility and a general description of John F. Kennedy Space Center (KSC) launch and landing site operations.
- b. Facility Handbooks - Each handbook provides a narrative description of the facility and its systems. Also, general operating rules, regulations, and safety systems are discussed in these handbooks. Handbooks available are:

K-STSM-14.1.1	Facilities Handbook for Building AE
K-STSM-14.1.2	Facilities Handbook for Building AO
K-STSM-14.1.3	Facilities Handbook for Building AM
K-STSM-14.1.4	Facilities Handbook for Hangar S
K-STSM-14.1.6	Facilities Handbook for Explosive Safe Area 60A
K-STSM-14.1.7	Facilities Handbook for Spacecraft Assembly and Encapsulation Facility Number 2
K-STSM-14.1.8	Facilities Handbook for Radioisotope Thermoelectric Generator Storage Building
K-STSM-14.1.9	Facilities Handbook for Life Sciences Support Facility Hangar L
K-STSM-14.1.10	*Payload Accommodations at the Rotating Service Structure
K-STSM-14.1.12	Facilities Handbook for Vertical Processing Facility
K-STSM-14.1.13	*Orbiter Processing Facility Payload Processing and Support Capabilities
K-STSM-14.1.14	*O&C Building Payload Processing and Support Capabilities
K-STSM-14.1.15	Facilities Handbook for Payload Hazardous Servicing Facility

These facility handbooks are not under configuration control; however, they will be reissued as necessary in order to maintain usefulness to customers in their planning for launch site processing of their payloads.

* These handbooks are titled differently because the facilities also serve functions other than payload support. Only the payload accommodations are described in these documents.

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- c. Standard Interface Documents (SID's) - These documents are intended to provide the payload-to-facility interface design details for these launch site payload processing facilities.

SID 79K12170	Payload Ground Transportation Canister
SID 79K16210	Vertical Processing Facility
SID 79K16211	Horizontal Processing Facility (O&C Building)
SID 79K17644	Payload Strongback
SID 79K18218	Launch Pad 39A
SID 79K28802	Launch Pad 39B
SID 79K18745	Orbiter Processing Facility
SID 82K00463	Payload Environmental Transportation System Multiuse Container

SID's are not available for all launch site payload processing facilities. In these cases, the facility handbooks must be used for design interface information and customers should ask for verification of any areas of concern. When SID's are available, they should be used as the official definition of the facility interfaces. There are some SID's for which there are no handbooks; e.g., the payload strongback and the Payload Environmental Transportation System (PETS) multiuse container. In these cases, the SID's must be used.

Customers may obtain copies of any of these documents through the assigned Launch Site Support Manager (LSSM).

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SECTION I

INTRODUCTION

1.1 PURPOSE

The purpose of this handbook is to provide basic information regarding payload processing and support capabilities in the Spacecraft Assembly and Encapsulation Facility Number 2 (SAEF-2), a hazardous processing facility (HPF), at KSC. The facility and its location are shown in figure 1-1. This facility was designed and constructed to accommodate ordnance installation, liquid propellant (hypergols) loading, hazardous systems tests and checkout, buildup, and any other potentially explosive or hazardous operations.

The KSC Launch Site Support Manager (LSSM), in conjunction with the Launch Site Support Team and the customer, will determine launch site facility utilization assignments based on identified payload requirements and overall Space Shuttle schedules or National Aeronautics and Space Administration (NASA) purchased Expendable Vehicles schedules. The documents identified in the Foreword describe the configuration of the Cape Canaveral Air Force Station (CCAFS) and KSC off-line payload processing facilities (PPF's) and HPF's which are available to potential customers.

1.2 SCOPE

This handbook is intended to be used by the customer as a guide for planning of payload activities in SAEF-2. It describes the capabilities and standardized interfaces of SAEF-2.

1.3 CUSTOMER CHARGE

Use of SAEF-2 for payload processing is considered an optional service.

1.4 FACILITY ACCOMMODATIONS

The facility accommodations available to the customer as identified herein provide support to a variety of NASA and NASA customer payloads and may accommodate payload elements being processed simultaneously. The customer must remain cognizant during design development of the necessity to share these facilities with other payload elements. Individual customer requirements should be coordinated closely with the KSC LSSM to assure that support is available when needed.

The SAEF-2 is a customer-operated facility. The customer is responsible for day-to-day operations including assuring someone in their team is certified by MDSS to open and close the powered door. The Payload Ground Operations Contractor (PGOC) is responsible for crane preoperation checks.

Customers will be familiar with the "Spacecraft Assembly and Encapsulation Facility Number 2 (SAEF-2) M7-1210, Emergency Procedures Document (EPD), Operational Maintenance Instruction (OMI) No. 59930."

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1.5 HAZARDOUS AND CONTROLLED WASTE

In advance of their arrival, customers will fill out KSC Form 26-551, "Process Waste Questionnaire," for any hazardous and controlled waste they expect to generate at KSC during processing. All waste generated at KSC will be managed in accordance with the requirements of KHB 8800.7, Hazardous Waste Management.

Once a customer has identified launch site waste generations, a satellite accumulation area (SAA) will be set up in facilities denoted as points of generation of these wastes.

These SAA's will be established in order to comply with the intent of the Resource and Recovery Act of 1976, which was established to institute a national program to control the generation, storage, transportation, treatment, and disposal of hazardous and controlled waste.

Customers should coordinate any waste operations or problems with their assigned LSSM. Regulations for the use of, control of, and disposal of waste at the launch site are strictly enforced.

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SECTION II

FACILITY DESCRIPTION

2.1 LOCATION AND DESCRIPTION

The SAEF-2, shown in figure 2-1, is located at F Avenue and 7th Street in the Hypergol Maintenance Facility Area, KSC Industrial Area (see figure 2-2). The facility is used for the assembly, test, encapsulation, ordnance work, propellant loading, and pressurization of spacecraft. The facility contains approximately 1556.08 meters (m)² (16,750 feet (ft)²) of usable floor space. Construction is of reinforced concrete and concrete block. The high bay is a steel frame structure with insulated aluminum siding.

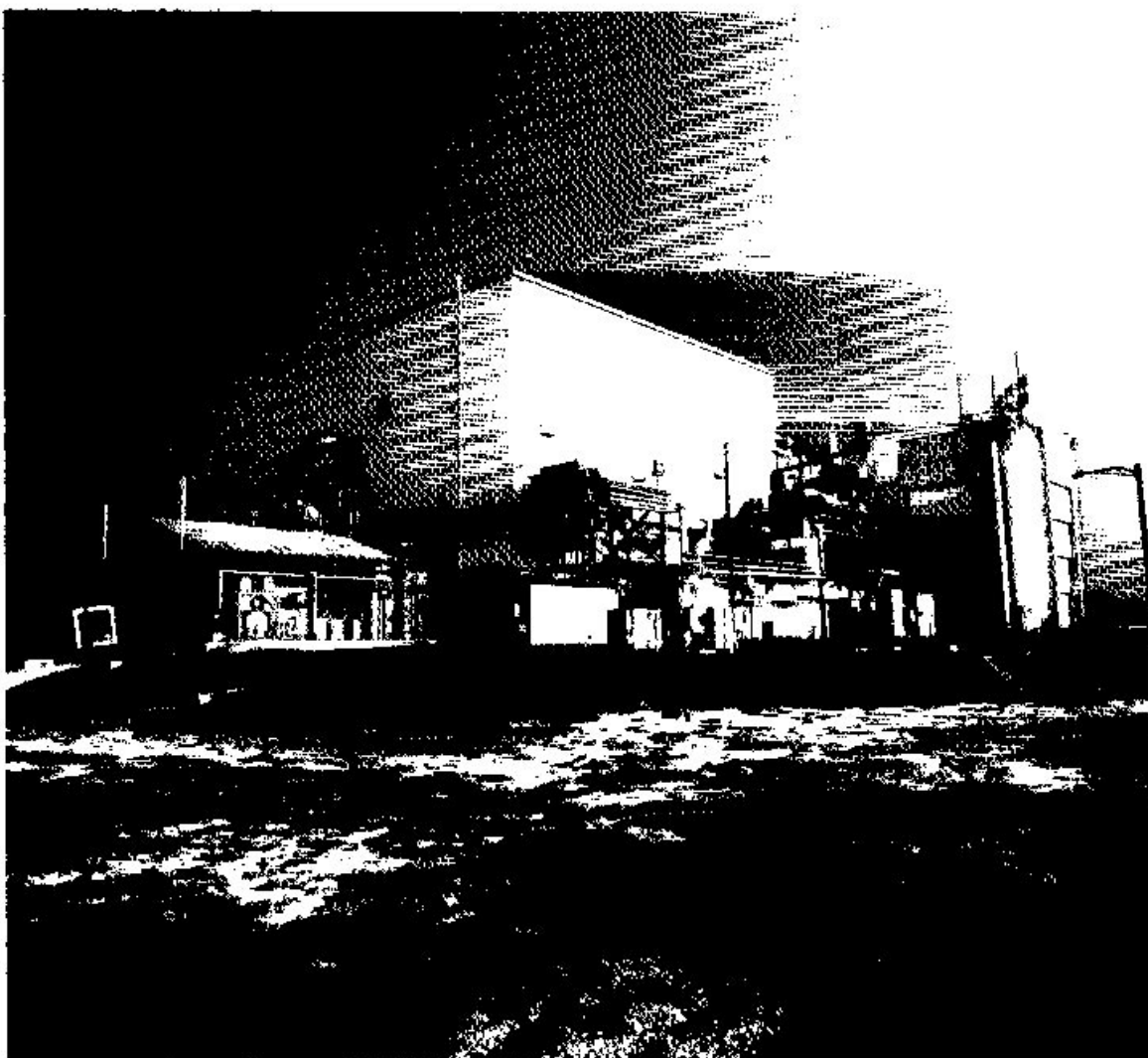


Figure 2-1. Spacecraft Assembly and Encapsulation Facility Number 2

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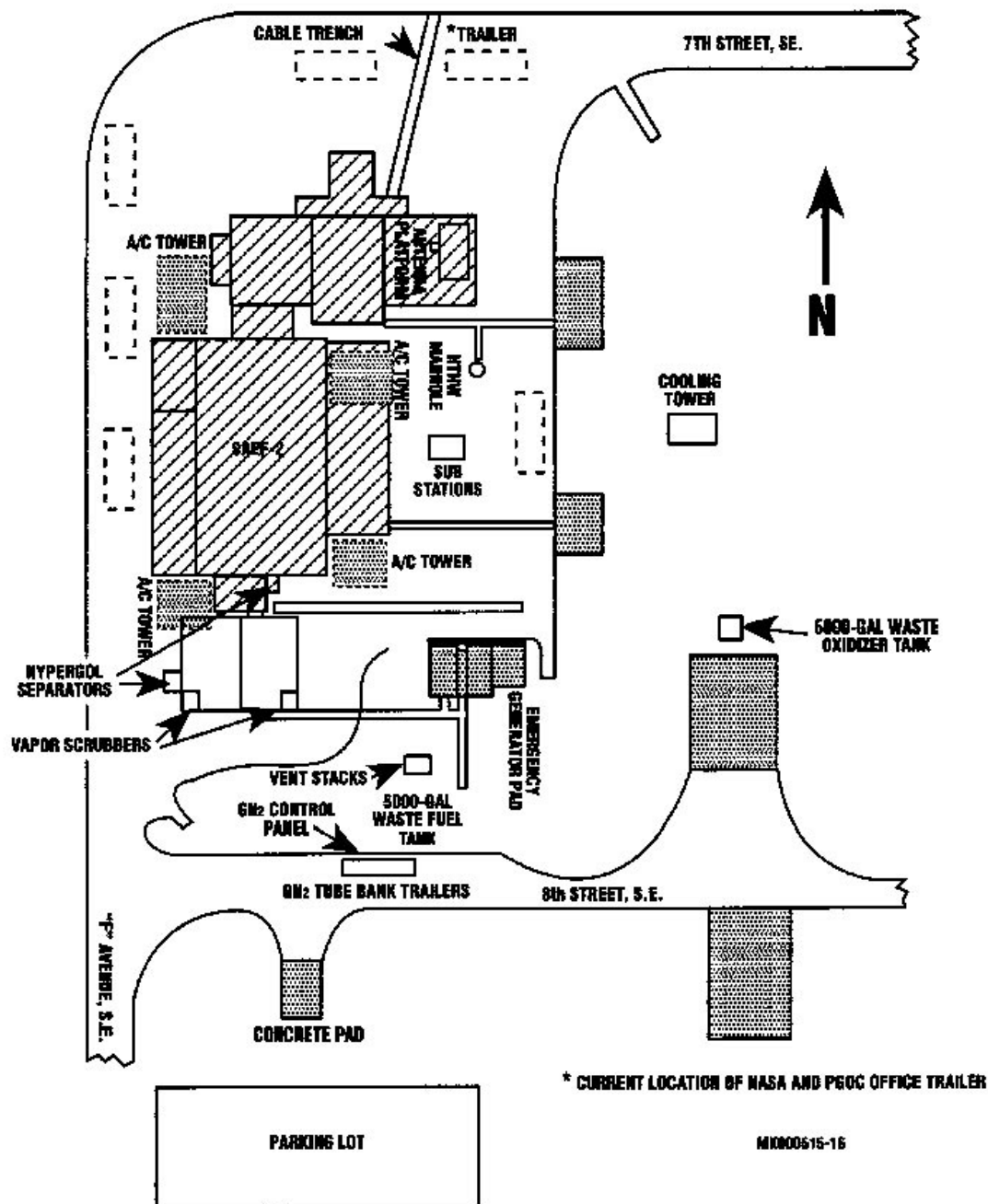


Figure 2-2. Site Plan, SAEF-2

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2.2 EXPLOSIVE RESTRICTIONS

Information concerning explosive restrictions will be determined by NASA-KSC Safety on a mission by mission basis.

2.3 PERSONNEL ACCESS

Because of the extreme hazard associated with explosives and propellants, stringent safety measures and security controls are enforced. Access to the facility will be controlled by a PGOC Access Control Monitor (ACM). The facility will be secured at all times when not manned by an ACM except that during periods when no flight hardware is present. The electronic Payload Access Control System (PACS) may be used in lieu of the ACM. The operational areas are controlled by electronic surveillance equipment including closed circuit television (CCTV), motion detection equipment and door alarms.

2.4 FACILITY USE BY OTHER PROGRAMS

Like all launch support facilities assigned to a particular project or resident contractor group, SAEF-2 is available to other programs on a non-interference basis if no other suitable facility is available.

2.5 FUNCTIONAL DIVISIONS

Functionally, the building is divided into the following areas: a clean work area (CWA) complex consisting of an airlock, a high bay, and two low bays; a test cell; a sterilization oven (non-operational); support office areas; and mechanical equipment rooms (figure 2-3). Floors in the airlock, high bay, and test cell are designed for 3175.20 kilogram (kg) (7000 pounds (lb)) per wheel plus 20 percent impact loading.

2.5.1 AIRLOCK. The airlock, located at the north end of the building, measures 12.5 m by 17.7 m (41 ft wide by 58 ft long), providing a usable floor area of 221 m² (2378 ft²) and is rated as a Class 300,000 CWA. The airlock has a clear ceiling height of 15.9 m (52 ft). Access is by means of personnel doors, vestibule, and a 6.4 m by 12.2 m (21.5 ft wide by 40 ft high) vertical lift equipment door. A 6.5 m by 12.1 m (21 ft wide by 39.5 ft high) horizontal sliding lift door separates the airlock from the adjacent high bay.

2.5.2 HIGH BAY. The high bay measures 14.9 m by 30.2 m (49 ft wide by 99 ft long), providing a usable floor area of 450.7 m² (4851 ft²); clear ceiling height is 22.6 m (74 ft) and is rated as a Class 100,000 CWA. Personnel and small equipment can enter the high bay through the equipment airlock, equipped with air showers. Clear access is 1.4 m by 2.1 m (4 ft 5 in wide by 6 ft 11 in high).

2.5.3 LOW BAYS. Two large bays are located along the west side of the high bay. One of the bays measures 5.8 m by 21.9 m (19 ft wide by 72 ft long) with a clear ceiling height of 7.62 m (25 ft); the other bay is 5.8 m by 8.2 m (19 ft wide by 27 ft long) and has a clear ceiling height of 13.3 m (43.5 ft). The combined bay areas provide a usable floor space of 174.8 m² (1881 ft²). The low bays are also rated as Class 100,000 CWA's.

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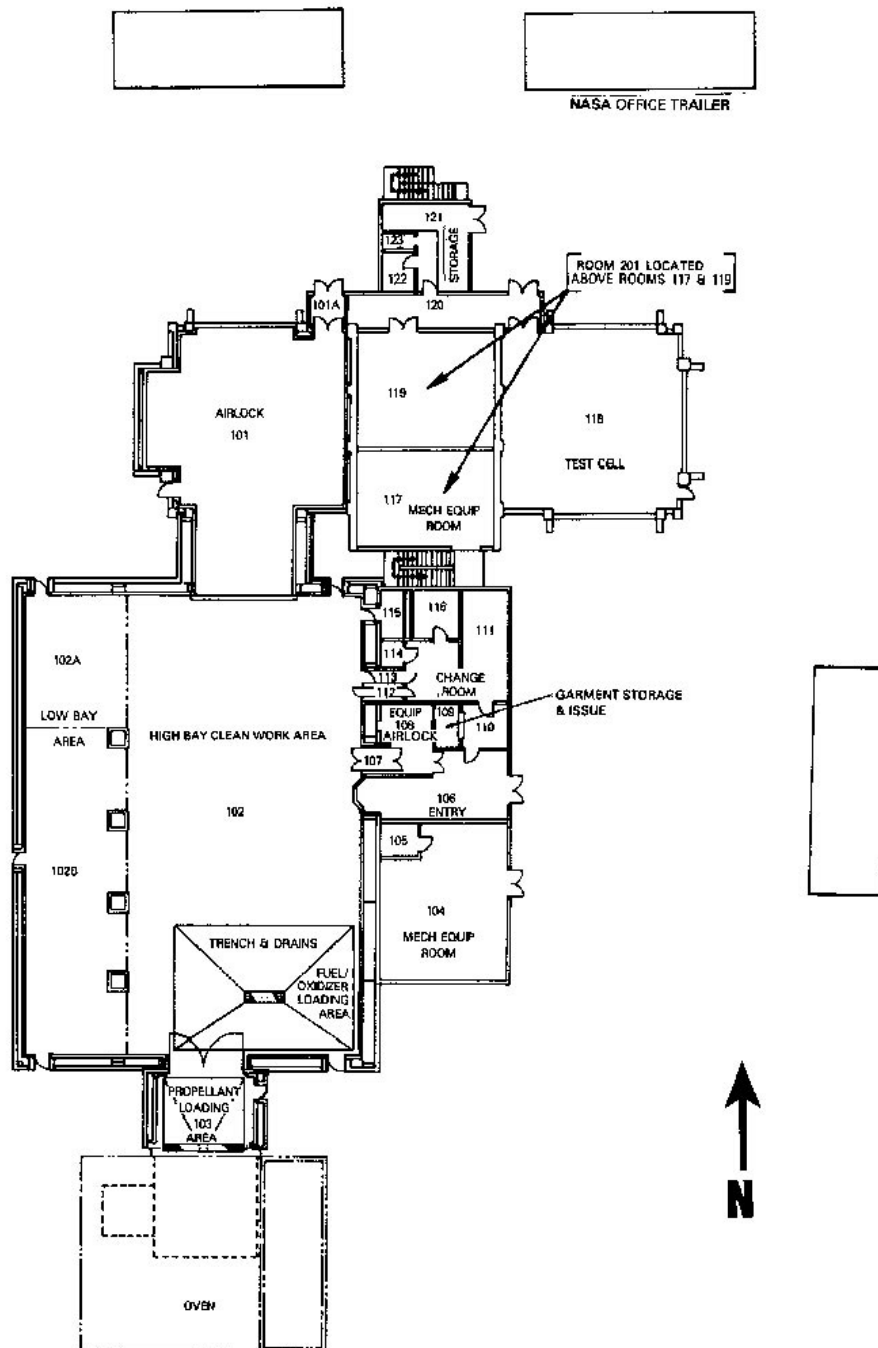


Figure 2-3. Floor Plan, SAEF-2

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2.5.4 TEST CELL. The test cell is located at the northeast corner of the facility. The cell measures 11.3 m by 11.3 m (37 ft by 37 ft), providing a usable floor area of 127.2 m² (1369 ft²). The clear ceiling height is 15.9 m (52 ft). Access to the test cell is by means of personnel doors and three 6.7 m by 12.2 m (22 ft wide by 40 ft high) vertical lift doors. The test cell can be used for spacecraft and payload support activities not requiring Class 100,000 CWA conditions.

2.5.5 OTHER ROOMS. The remainder of the building consists of such support rooms as a mechanical equipment room, communication equipment room, entry and observation room, change room, storage room, miscellaneous equipment rooms, and limited office space. Table 2-1 provides room specifications for SAEF-2.

The sterilization oven is located at the south end of the facility in a 13.1 m by 16.2 m (43 ft wide by 53 ft long) open-sided shed. Ceiling height of the shed in the oven area is 4.9 m (16 ft). (The oven is not operational.)

There is a 13.7 m by 8.5 m (45 ft long by 28 ft wide) conference area located on the second floor above rooms 117 and 119.

Room 109 is used as the clean room garment storage and issue room.

2.5.6 TRAILERS. There are five 3.7 m by 18.3 m (12 ft by 60 ft) office trailers, figure 2-3, available for payload personnel use when their payload is in SAEF-2. Two are on the north side of the building; two, on the west side; and one, on the east side. One of the trailers located on the north side is used by the NASA and PGOC facility managers.

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Table 2-1. SAEF-2 Room Specifications

Room No.	Length M (Ft)	Width M (Ft)	Area M ² (Ft ²)	Ceiling M (Ft)	Largest Doorway M (Ft)	Floor	Walls	Ceiling	Function
101	17.7 (58)	12.5 (41)	221 (2373)	15.8 (52)	6.7 x 12.2 (22 x 40)	Vinyl	GWB-P	ACST (PF)	Airlock (1)
101A	1.8 (6)	2.1 (7)	3.9 (42)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	CMU-P	GWB-P	Equipment Airlock
102	30.2 (99)	14.9 (49)	450 (4851)	22.6 (74)	6.4 x 12.0 (21 x 39.5)	Vinyl	GWB-P	ACST (PF)	High Bay Clean Room
102A	8.2 (27)	5.8 (19)	47.7 (513)	13.3 (43.5)		Vinyl	GWB-P	ACST (PF)	Low Bay Area
102B	22 (72)	5.8 (19)	127 (1368)	7.6 (25)		Vinyl	GWB-P	ACST (PF)	Low Bay Area (2)
103	4.9 (16)	6.4 (21)	31.2 (336)	4.1 (13.5)	0.9 x 3.7 (3 x 12)	Vinyl	GWB-P	ACST (PF)	Passageway
104									Mechanical Equip Room
105	2.1 (7)	2.4 (8)	5.2 (56)	3.7 (12)	0.9 x 2.1 (3 x 7)	Vinyl	CMU-P	GWB-P	Communication Room
106	4.6 (15)	4.7 (15.5)	21.6 (233)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	CMU-P	GWB-P	Entry Room (3)
107	1.8 (6)	1.8 (6)	3.3 (36)		0.9 x 2.1 (3 x 7)				Equip Air Shower (4)
108	4.9 (16)	3.2 (10.5)	15.8 (168)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	GWB-EP	GWB-EP	Equipment Airlock
109	3.0 (10)	1.7 (5.5)	5.1 (55)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	GWB-P	GWB-P	Garment Storage/ Issue (6)
110	3.0 (10)	2.9 (9.5)	8.8 (95)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	GWB-P	GWB-P	Security Room
111	7.2 (23.5)	3.0 (10)	21.8 (235)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	GWB-EP	GWB-EP	Change Room (6)
112	1.2 (4)	2.7 (8.75)	3.3 (36)						Personnel Air Shower
113	1.1 (3.5)	2.7 (8.75)	2.8 (30.6)	2.4 (8)	0.9 x 2.1 (3 x 7)	Vinyl	GWB-EP	GWB-EP	Personnel Airlock
114									Janitor's Closet
115									Janitor's Closet
116									Toilet (Clean Room Only)
117									Mechanical Equip. Room
118	11.3 (37)	11.3 (37)	127 (1369)	15.8 (52)	6.7 x 12.2 (22 x 40)	Vinyl	CMU-P	ACST	Test Cell
119	7.8 (25.5)	8.8 (29)	68.7 (740)	3.0 (10)	0.9 x 2.1 (3 x 7)	AT	CMU-P	GWB-P	Communication Room
120									Corridor
121	5.8 (19)	3.4 (11)	19.4 (209)	3.0 (10)	0.9 x 2.1 (3 x 7)	AT	CMU-P	GWB-P	Storage
122									Toilet
123									Shower Room
201	13.7 (45)	8.5 (28)	117 (1260)	3.0 (10)	0.9 x 2.1 (3 x 7)	Vinyl	CMU-P	ACST	Conference Room (7)

ACST (PF) - Acoustical (Plastic Face)
AT - Asphalt Tile
CMU - Concrete Masonry Units
CONC. - Concrete
EP - Epoxy Painted
GWB - Gypsum Wallboard
P - Painted

Length dimensions are N - S direction
Width dimensions are E - W direction

NOTES:
(1) Dimensions shown are at widest point.
(2) Area dimensions shown include space occupied by column areas.
(3) Dimensions shown do not include area toward viewing window which is 2.34m x 4.57m (8 ft x 15 ft).
(4) Pre-fabricated units
(5) Dimensions shown include air shower projection into room.
(6) Area dimensions shown include space occupied by wall shelves and lockers.
(7) Area dimensions shown include wall partition and duct space located 3.20m (10 ft - 6 in) from south wall.

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SECTION III

MECHANICAL SYSTEMS

3.1 MATERIAL HANDLING EQUIPMENT

Both the airlock and the test cell each have a 9.08 metric ton (10-ton) bridge crane that operate on their own twin runway girder rails. The hook height at both locations is 13.7 m (45 ft).

The high bay CWA has a 18.16 metric ton (20-ton) bridge crane that operates on twin runway girder rails; the hook height is 19.9 m (65 ft 5 in). See paragraph 3.13 for additional data on crane operations.

Cranes may be operated only by trained personnel. The KSC contractor support personnel will provide crane training for customer personnel as required in accordance with Kennedy Management Instruction 6430.4, Examination and Licensing of KSC Facility Crane Operators. Physical examinations are a prerequisite to crane training.

3.2 COMPRESSED AIR

Compressed air is available at 6.2 and 10.3 bars (90 and 150 pounds per square inch gage (psig)); 170 standard cubic ft per minute (scfm) nonregulated and 300 scfm nonregulated in the airlock, CWA, and oven area. See figure 3-1 for outlet locations. Each active outlet is equipped with a shutoff valve, a filter, a moisture trap, and a quick-disconnect fitting. Air compressing equipment is located in room 104. Compressed air systems are not clean systems, (not certified to KSC-C-123) however, air provided to the CWA's passes through three-micron final filters and will not degrade room cleanliness.

3.3 AIR-CONDITIONING

All operational areas of this building are environmentally controlled. Temperature control is maintained at 21.7 ± 3.3 °C (71 ± 6 °F) with a relative humidity of 50 percent or less. The air-conditioning system is high efficiency particle air (HEPA) filtered and fed by five air handlers recirculating the air 11 times each hour. The CWA fresh air is replenished 2.5 times each hour.

The high bay is a Class 100,000 CWA. Personnel enter the high bay area through an air shower in room 112. High bay floors are tiled, and walls are painted gypsum wallboard. The airlock can be cleaned and maintained as a Class 300,000 CWA. Primary use for the airlock is cleaning and preparation of hardware before entry into the high bay. The customer provides the cleaning equipment and agent. Both the clean room and the airlock have a 10.16 cm (4 in) outside diameter spacecraft air-conditioning outlet, MS33660-64 Type A bead, 0.91 m (3 ft) above the floor for auxiliary air-conditioning service. See figure 3-1 for air-conditioning service locations.

Air-conditioning systems in the remote SAEF-2 payload control room building will maintain the office areas at 25.6 °C (78 °F) in the summer and 22.2 °C (72 °F) in the winter. The control rooms will be maintained at 22.2 °C (72 °F) throughout the year. All areas will be maintained at a relative humidity of 50 percent or less.

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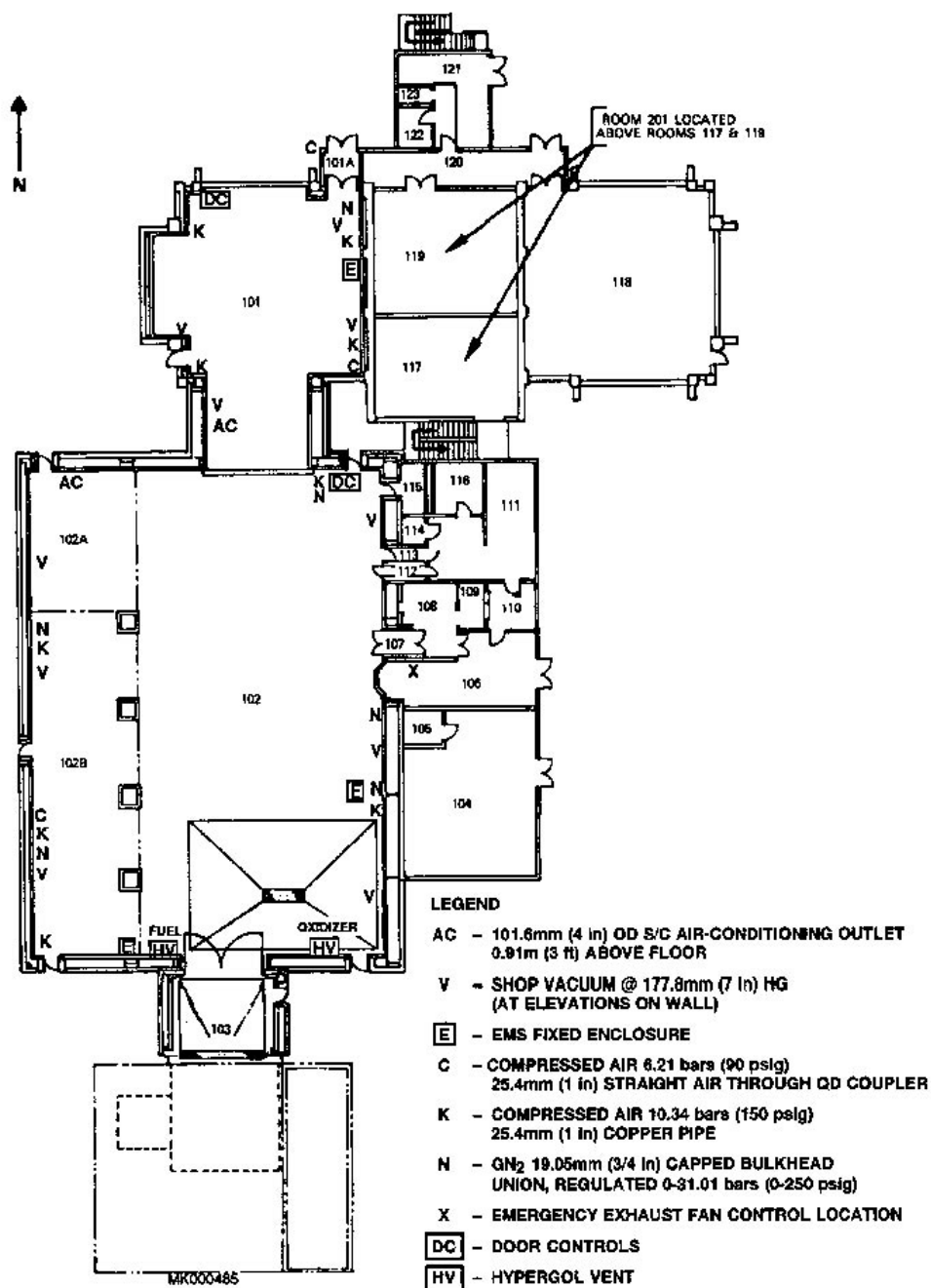


Figure 3-1. Pneumatics, Air Conditioning, EMS Enclosure, Vacuum System, and Emergency Exhaust Fan Control Locations in SAEF-2

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3.4 CONTAMINATION CONTROL AND MONITORING SYSTEM

The SAEF-2 is a partial laminar flow CWA. The high bay is rated as a CWA level 4 and the airlock is rated as a CWA level 5.

An Environmental Monitoring System provides real-time and historical data on the necessary parameters relative to maintaining a clean working environment and is supplemented by physical measuring techniques. Environmental conditions are continuously monitored, stored, and recorded for temperature, relative humidity, and airborne particle concentration. Surface particulate matter, nonvolatile residue, and volatile hydrocarbon monitoring is performed by conventional methods. (See table 3-1 for cleanliness requirements.)

Table 3-1. Cleanliness Requirements [1]

Clean Work Area Levels		Level #4	Level #5
Parameter	Air Flow	Non-Laminar	Non-Laminar
Maximum Airborne Particle Counts (Per Cubic Foot)	Req $\geq 0.5 \mu\text{m}$	100,000	300,000
	Req $\geq 5.0 \mu\text{m}$	700	1,000
	Monitoring	Continuous	Monthly
Temperature (°F) [3]	Requirement	71±6	71±6
	Monitoring	Continuous	Monthly
Relative Humidity (Percent) [3]	Requirement	50 Max	50 Max
	Monitoring	Continuous	Monthly
Maximum Particle Fallout [2]	Goal	Level 750	Level 1000
	Monitoring	Continuous	Every 6 Months
Maximum NVR (mg/0.1m ² /month)	Requirement	1.0	2.0
	Monitoring	Continuous	Annually
Maximum Volatile Hydrocarbons (PPM) (v/v)	Requirement	15	N/A
	Monitoring	Every 2 Weeks	N/A
Minimum Positive Pressure	Requirement	0.02 in. H ₂ O	N/A
	Monitoring	Daily	N/A
Minimum Air Changes	Requirement	4/Hour	2/Hour
[1] During Periods of Operation [2] Levels Per MIL-STD-1246 for a 24-Hour Period [3] Program OMRSD May Supersede These Requirements			

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Sensor sets have been installed in recessed purged cabinets in south and east walls of the high bay and in similar recesses in the east wall of the airlock (see figure 3-1). Each set contains a temperature sensor that reads °F, a relative humidity sensor that reads percentage, and a laser particle counter that measures airborne particle concentration.

The Continuous Monitor/Analyzer, referred to as the mainframe, is the heart of the monitoring equipment. The mainframe is centrally located and remote from the sensors. The multiple sensor outputs are connected by coaxial cable. The mainframe identifies the information from the sensors, files it in time-correlated channels of data, and provides an output to the host computer system. The mainframe and the computer are located in room 106. Real time data and a printed record of environmental out-of-specification conditions (if any) are available from the computer. During propellant operations, toxic vapor detectors are activated (one oxidizer and fuel set in the airlock and one set in the high bay) and results of their sampling are also available from the printed computer record.

3.5 VACUUM SYSTEM

The high bay and airlock are serviced with a vacuum system at 17.78 cm (7 in) of mercury for cleaning purposes. See figure 3-1 for outlet locations. Outlets are placed in three elevations on the walls: the floor, midway on the wall, and near the ceiling.

3.6 GASEOUS NITROGEN (GN₂) SYSTEM

GN₂ is provided in 17.24 bars (250 psig) to the CWA and airlock through wall-mounted 1.9 cm (3/4 in) KSC capped bulkhead unions. See figure 3-1 for locations. This system is certifiable to KSC-SPEC-123, level 300. GN₂ can be provided to the east test cell from an exterior mobile tube bank.

3.7 PROPELLANT WASTE DRAIN SYSTEM

This is a non-storage system to be used for contingency spills during hypergolic operations. It consists of a trench drain with an oxidizer and fuel drain line to their respective stainless steel tanks. All leaks and spills should be immediately removed by use of an aspirator.

A 18925 L (5000 gallon (gal)) stainless steel waste fuel tank is located underground southeast of the building. There is also one 18925 L (5000 gal) stainless steel oxidizer waste tank located underground east of the building next to the cooling tower.

A line leading to the waste tanks is located in rooms 102 and 103. Waste from the sterilization oven area is carried through a 10.2 cm (4 in) stainless steel pipe to the tank.

NOTE

Use of this drain system should never be a planned part of any hypergolic operation

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3.8 KRYPTON VENT, HYPERGOL EMERGENCY EXHAUST FANS, AND HYPERGOL VENT SYSTEM

3.8.1 KRYPTON VENT. The Krypton vent consists of an internal bulkhead connecting to an external vent stack leading to the top of the south side of the high bay.

3.8.2 HYPERGOL EMERGENCY EXHAUST FANS. Six manually initiated belt-driven centrifugal exhaust fans have been installed in the bay area: two 1-horsepower (hp) fans rated at 1784.15 L/second (sec) (3780 cubic ft per minute), two 3-hp fans rated at 4158.32 L/sec (8810 cfm), and two 3-hp fans rated at 3573.04 L/sec (7570 cfm). Keyswitch controls for this system are located in the SAEF-2 observation room and on console 2 in each M7-1061 control room.

The emergency exhaust system, also called the remote control emergency exhaust assembly, is part of the heating, ventilation, and air-conditioning system at SAEF-2 and is used to exhaust residual fumes after cleanup of a hypergol spill.

Activation of a keyswitch control start button will stop air handlers 1, 2, 3, and 4, close return air dampers and open purge exhaust dampers, open outside air dampers, open emergency system intake dampers, and start all exhaust fans.

Activation of a keyswitch control stop button stops the purge fans, repositions the dampers to their normal position, and restarts the air handling unit supply fans.

Three manually initiated belt-driven centrifugal 10-hp exhaust fans rated at 9534.40 L/sec each (20,200 cfm each) have been installed in the test cell area and work in conjunction with air handler 8.

3.8.3 HYPERGOL VENT SYSTEM. Hypergol vents are located on the south wall of the high bay. Vapors are piped into the respective fuel or oxidizer separators, travel into the hypergol scrubber system, and are vented. Aspirated (vacuumed) hypergol liquids are retained in the aspirator and vapors are exhausted through the hypergol vents.

3.9 FIRE PROTECTION SYSTEM

Heat detectors are installed in the ceiling of most rooms. Smoke detectors are installed in the airlock and high bay CWA air-conditioning ducts. Hand-operated, pull-type fire alarm boxes are also located at strategic places throughout the building. Activation of either alarm causes a coded signal to be transmitted to the KSC Launch Control Center, Room 1P10, KSC Protective Services Control Center. At the same time, alarm bells are sounded in and around the building.

SAEF-2 has a water deluge system with nozzles that protrude from the wall in the south third of the high bay. There are also spray heads in recesses in the ceiling above this same area and spray heads in recesses in the ceilings of the passageway and the south half of the low bay. Controls for this system are located on the wall adjacent to all the emergency exits, on the north wall of the observation room, and on the appropriate payload control room console in Building M7-1061. Only the controls in the observation room and the Payload Control Rooms in Building M7-1061 have a shutoff capability.

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NOTE

To help preclude the deluge system from being turned on inadvertently, two distinct actions must be taken before it can be activated; the system must be armed and then activated.

A wet-pipe automatic sprinkler system is provided over each of the two scrubbers under a canopy at the south end.

3.10 SAFETY EQUIPMENT

Amber and red flashing omnidirectional lights are mounted on the outside of the building above the roof line. These lights are used to indicate that hazardous operations are being conducted inside the building. An eyewash and safety shower are located approximately 1.5 m (5 ft) from the southeast corner of the building. Eyewash and safety showers are located at each of the waste tanks (fuel and oxidizer) and between the fuel and oxidizer scrubbers.

3.11 WATER SYSTEM

Hot and ambient temperature water is supplied to various locations throughout the high bay, airlock, and sterilization oven areas by means of 1.3 cm (1/2 in) and 1.9 cm (3/4 in) pipes through standard hose bibbs. The maximum waterflow rate is between 26.5 and 37.9 L/min (7 and 10 gallons per minute). Heating is provided by temperature control.

3.12 STERILIZATION OVEN

A 13.1 m by 16.2 m (43 ft wide by 53 ft long) open-sided shed that houses the sterilization oven, once used for sterilization of planetary probe spacecraft, is located at the south end of the facility. The oven measures 6.4 m by 6.7 m by 4.9 m (21 ft by 22 ft by 16 ft high). Outside the oven are the following:

- a. Hazardproof lights and Operational Intercommunication System Digital (OIS-D)
- b. Safety shower and eyewash fountains
- c. Catch basin for leaks or spills, with a drain line to the waste fuel tank

The area is currently used for non-air-conditioned storage and is located immediately south of room 103.

3.13 CRANES AND HOISTS

Three bridge cranes are available in the facility. The airlock (room 101) and the test cell (room 118) each have a 9.1 metric ton (10-ton) crane and the high bay (room 102) has a 18.2 metric ton (20-ton) crane.

3.13.1 AIRLOCK AND TEST CELL CRANES. The two 9.1 metric ton (10-ton) bridge cranes are identical in design and installation. Each hoist bridge operates on twin runway girder rails and is powered by a two-speed 0.6 m/min or 1.8 m/min (2 ft/min or 6 ft/min) motor. Power is supplied through festoon cabling supported by a carrier assembly and track. In a similar manner, the trolley moves on twin bridge rails and is powered by the same type of motor as is used on the bridge. The electrical power is also supplied to the trolley unit through festoon

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cabling supported by a carrier assembly and track. Speeds for the trolley are 0.6 m/min or 1.8 m/min (2 ft/min or 6 ft/min). Both the trolley and bridge automatically come to a stop at the extreme ends of their travel due to activation of travel limit switches and the setting of electromagnetic brakes. The cranes are controlled from the floor by cable and pendant pushbutton switches for speed selection (SLOW and FAST) and one indicator light that illuminates when power is applied. One remote power control panel with an indicator light for each crane is provided to allow emergency power cutoff from the second floor, room 201.

The crane, powered by a two-speed motor, is capable of lifting a load to a height of about 13.7 m (45 ft) at 0.6 m/min or 1.8 m/min (2 ft/min or 6 ft/min). The crane is equipped with a standard brake capable of stopping and holding a 9.1 metric ton (10-ton) load. The electromagnetic brake is backed up by a mechanical load brake. Additionally, a counter-weighted limit switch and upper and lower-gear limit switches are provided for protection against over-travel of the hoist hook block.

Purge lines (GN₂) with necessary pressure gage, shut-off valves, and bleed-off valves are provided for the purge of the explosionproof pendant control and relay control cabinet. The purge system is available in the airlock and in room 118.

3.13.2 HIGH BAY CRANE. The bridge crane, located in the high bay CWA, is designed to provide a lifting capability of 18.2 metric tons (20-tons). The bridge crane operates on twin runway girder rails and is powered by a one-speed, 0.46 m/min (1.5 ft/min) micromotor and a two-speed, 2.1 m/min or 6.4 m/min (7 ft/min or 21 ft/min) main motor. Power is supplied through a cable reel assembly.

In a similar manner, the trolley moves on twin bridge rails and is powered by the same types of micromotor and main motor that are used on the bridge. Electrical power is supplied to the trolley through a cable reel assembly. Speeds for the trolley are 0.46 m/min (1.5 ft/min), 2.2m/min (7.33 ft/min), or 6.7 m/min (22 ft/min). Both the bridge and trolley will automatically come to a stop at the extreme ends of their travel due to activation of travel limit switches and the setting of electromagnetic brakes.

The crane is controlled by a cable and pendant pushbutton station suspended from the bridge assembly. The pendant is equipped with six pushbutton switches for operation of the crane, trolley, and bridge; and two pushbutton switches for power application (ON-OFF). The crane is powered by a one-speed 0.5 m/min (1.5 ft/min) micromotor and a two-speed, 2.13 m/min or 6.4 m/min (7 ft/min or 21 ft/min) main motor and is capable of lifting a load to a height of 19.2 m (63 ft) at 0.46, 2.13 or 6.4 m/min (1.5, 7, or 21 ft/min). The crane is equipped with a standard brake capable of stopping and holding a 18.2 metric ton (20-ton) load. The electromagnetic brake is backed up by a mechanical load brake. A counterweight limit switch and an upper and lower-gear limit switch are provided for protection against over-travel of the hoist hook block.

The 18.2 metric tons (20-ton) overhead crane travel is within 1.8 m (6 ft) of the west high bay wall, 1.2 m (4 ft) of the east wall, to 3.2 m (10 ft 6 in) of the south wall, and 2.6 m (8 ft 6 in) of the north wall. It has a explosionproof pendant pushbutton control station. Hook height maximum is 19.9 m (65 ft 5 in).

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SECTION IV

ELECTRICAL SYSTEMS

4.1 ELECTRICAL POWER

Standard 120-Volt (V), 20-Ampere (A), single-phase, 60-Hertz (Hz), alternating current (ac) electrical power is available throughout all areas of the building. This service is provided through explosionproof receptacles in the airlock, the high and low bays, the test cell, and the oven area. Table 4-1 summarizes electrical power available in the airlock, high bay, oven area, test cell, and the mechanical equipment room. See figure 4-1 for the location of the major electrical service receptacles. There is standard 120-V, 20-A, single-phase, 60-Hz ac power available in the six office trailers.

Table 4-1. Electrical Power Available in SAEF-2

Volts	Amperes	Phase	Location*
120	20	1	(1e), (2e), (3e), (4)
120	30	1	(1e), (2e), (3e), (4)
120	30	1	(5e)
120/208	30	3	(2e)
120/208	30	3	(5e)
120/208	100	3	(4)
120/208	100	3	(2e), (4)
480	30	3	(5e)
480	100	3	(5e)
480	200	3	(6)
480	150	3	(2e)
* Location: (1) Airlock (2) High Bay (3) Oven Area (4) Mechanical Equipment Room (5) Test Cell (6) Room 201 e = explosionproof receptacle			

4.2 ILLUMINATION

The control room, mechanical equipment room, and all other support areas are illuminated by fluorescent lamps. The CWA complex (high bay, low bay, and airlock), sterilization oven, and the test cell area are illuminated by explosionproof metal halide lamps rated at 1075 lumens/meters² (100 ft candles).

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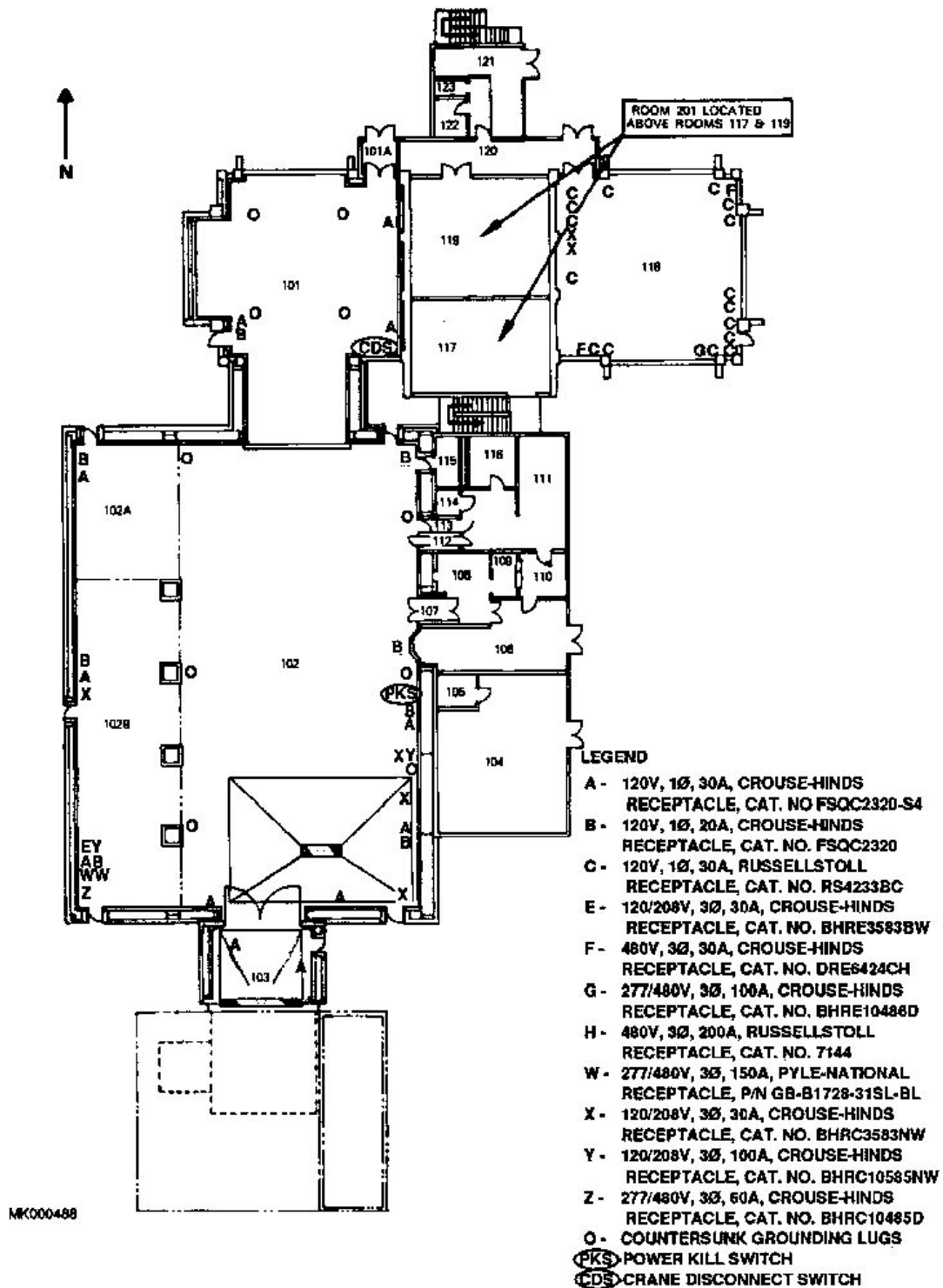


Figure 4-1. Electrical Receptacles and Grounding Lugs, SAEF-2

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4.3 GROUNDING

All structural metal, appropriate metallic components and equipment, the conductive vinyl tile floor in the airlock and service bay, and lightning air terminals are connected to the structural grounding system. This system consists of 15 interconnected rods located around the periphery of the building. Isolated equipment grounds are located in the control room and the mechanical equipment room. See figure 4-1 for location of countersunk grounding lugs.

4.4 LIGHTNING PROTECTION

Lightning protection is provided by an interconnected system of roof-mounted air terminals and down conductors connected to the building steel and subsequently to the counterpoise.

4.5 EMERGENCY CUTOFF SWITCH

A single-point electrical emergency cutoff circuit is provided. A receptacle is mounted on the east wall, near the observation window, where a 30.48 m (100 ft) cord with an activation button can be plugged in. Activation of this button will remove ac power from the 120 V and 120/208 V outlets in the high bay used for test or monitoring equipment.

4.6 BACK-UP POWER

Provisions have been made for back-up power to be supplied by a government-furnished diesel generator through a manual transfer switch located in room 104. This back-up system will only supply power to the bay cranes, receptacles, and lights.

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SECTION V

BUILDING M7-1061 REMOTE CONTROL ROOMS AND SUPPORT AREAS

5.1 DESCRIPTION

The remote control rooms and support areas, figure 5-1, are located approximately 205.7 m (675 ft) northeast of the SAEF-2, figure 5-2. They were built as an addition to existing Building M7-1061, and are interconnected to SAEF-2 by a cableway. This addition is a prefabricated steel building covered on the exterior with insulated metal siding and was designed to be the office area and payload control rooms for customers using the SAEF-2. See table 5-1 for room specifications.

5.2 ACCESS

Personnel have free access to the customer areas during normal duty hours with exception of the payload control rooms when a customer elects to limit entry through an access list. The LSSM will coordinate the preparation of Entry Authorization Lists.

5.3 CUSTOMER AREAS

5.3.1 OFFICE AREAS. Rooms 136, 137, 141, 142, 143, and 144 are normally utilized as comfortable individual offices while rooms 139 and 140 can each comfortably seat several support personnel.

5.3.2 CONFERENCE ROOM. This room is adjacent to room 139 and can comfortably seat 15 persons.

5.3.3 PAYLOAD CONTROL ROOMS. These rooms function as the customer ground station for checkout and testing of their payload located in SAEF-2. They are separated by a rolling door that can be opened to provide use of both rooms by a single customer if necessary.

There are six consoles in each room; 1, 4, and 6 are available for customer use, and 2, 3, and 5 are operated by either NASA or PGOC.

Consoles 1 and 6 are video switchers and each contains two monitors and two switchers. Console 4 functions as the customer test director console and contains an OIS-D panel, a paging/area warning and evacuation panel, and the test director page and zone area switch panel.

Console 2 is the safety console and controls the SAEF-2 water deluge system and emergency exhaust fan system. Console 2 also contains the paging/area warning and evacuation panel and the safety page and zone area switch panel. Console 3 functions as the CCTV control panel and contains two monitors, one switcher and a countdown clock. Console 5 functions as both the direct current power and the fuel and oxidizer scrubbers control panel.

5.4 HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS.

The payload control rooms and office support areas air-conditioning and reheat systems can maintain a temperature of 21.7 ± 3.3 °C (71 ± 6 °F) with a relative humidity of 50 percent or less.

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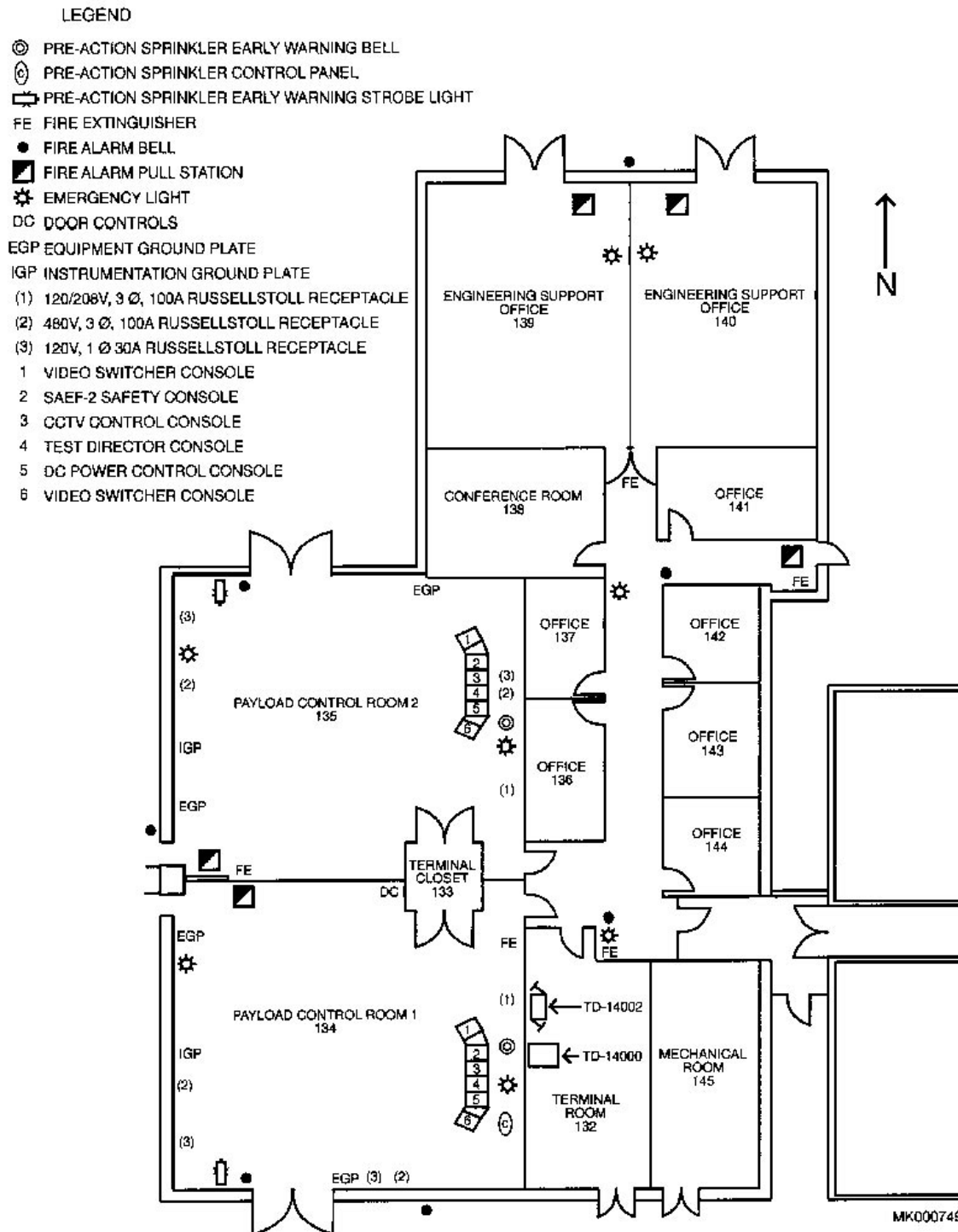


Figure 5-1. SAEF-2 Building M7-1061 Addition

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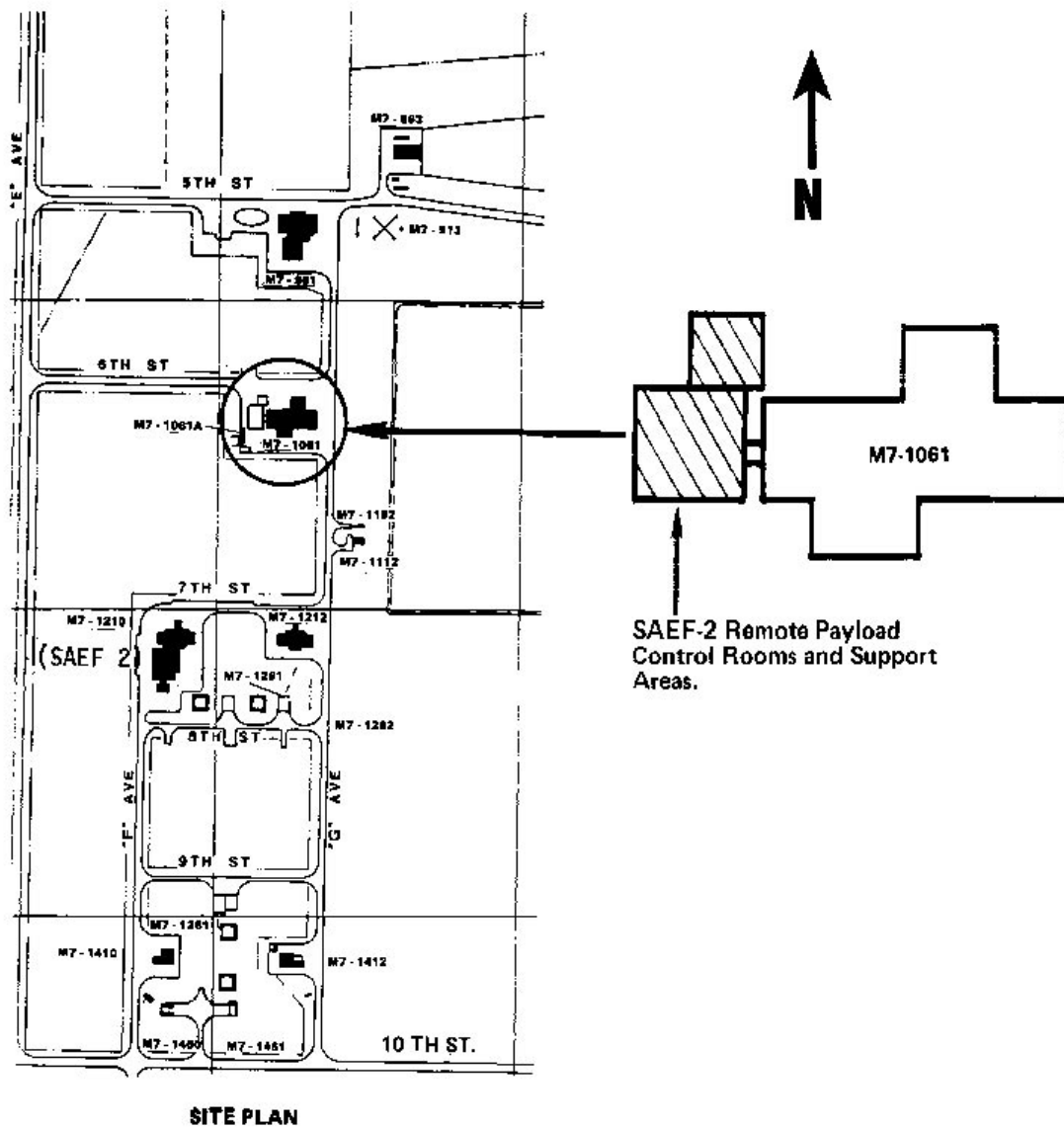


Figure 5-2. Site Plan, Building M7-1061

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Table 5-1. SAEF-2 Building M7-1061 Room Specifications

Room No.	Length	Width	Ceiling Height	Largest Doorway	Floor	Walls	Ceiling	Function
134	10.7m (35'2")	9.9m (32'5")	2.6m (8'6")	2.4m x 3.1m (8' x 10')	VTB	GWB	SACT	Payload Control Room 1
135	10.7m (35'2")	9.9m (32'5")	2.6m (8'6")	2.4m x 3.1m (8' x 10')	VTB	GWB	SACT	Payload Control Room 2
136	3.8m (12'5")	2.2m (7'4")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Office
137	3.8m (12'7")	2.2m (7'3")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Office
138	5.1m (16'10")	4.3m (14'2")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Conference Room
139	8.2m (26'9")	6.4m (21'0")	2.4m (7'11")	2.1m x 2.2m (6'10" x 7'2")	Carpet	GWB	SACT	Engineering Support Office
140	8.2m (26'9")	5.6m (18'5")	2.4m (7'11")	2.1m x 2.2m (6'10" x 7'2")	Carpet	GWB	SACT	Engineering Support Office
141	4.3m (14'0")	2.7m (8'9")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Office
142	3.2m (10'6")	2.7m (9'0")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Office
143	3.2m (10'7")	2.7m (9'0")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Office
144	3.2m (10'7")	2.7m (9'0")	2.4m (7'11")	0.9m x 2.1m (2'10.5" x 6'11")	Carpet	GWB	SACT	Office
LEGEND SACT - Suspended Acoustic Tile VTB - Vinyl Tile Block-Raised Floor CMUP - Concrete Masonry Unit-Painted m - Meter GWB - Gypsum Wallboard-Painted								

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5.5 FIRE PROTECTION SYSTEMS

5.5.1 FIRE DETECTION SYSTEM. There are three types of fire detectors in the control rooms and support rooms areas: heat activated detectors (HAD's), ionization detectors installed in the ceiling and air conditioning ducts, and ionization detectors installed under the floors. The HAD's are installed in all rooms (including the terminal room closet) and hallways of the area with exception of the two payload control rooms. The payload control rooms are protected by the ceiling mount and under floor ionization detectors. Mechanical room 145 and terminal room 132 are protected by HAD's and ceiling mount ionization detectors.

5.5.2 FIRE ALARM SYSTEM. Hand-operated, pull-type alarm stations are located at strategic places (see figure 5-1) throughout the building. Activation of either a fire detector or fire alarm causes a signal to be transmitted to the KSC Launch Control Center, Room 1P10, KSC Protective Services Control Center.

5.5.3 FIRE CONTROL EQUIPMENT. The payload control rooms are protected by an automatic Pre-action Sprinkler System with closed dry pendent sprinkler heads located at the ceiling. When activated, this system has a pre-action sprinkler warning light and warning bell in each room to alert personnel. In addition, a fire alarm signal is transmitted to Room 1P10.

There are several 4.5 kg (10 pound) dry chemical fire extinguishers located throughout the building (figure 5-1). These are portable, pressurized, squeeze-lever actuated fire extinguishers, and should only be used if the means of egress are blocked by fire.

5.6 ELECTRICAL SYSTEMS

5.6.1 ALTERNATING CURRENT. The ac industrial power available is as shown in figure 5-1.

<u>Voltage</u>	<u>Amperage</u>	<u>Phase</u>	<u>Hz</u>	<u>Type Receptacle</u>
* 120	20	single	60	NEMA 5-20R duplex
120	30	single	60	RussellStoll
120/208	100	three	60	RussellStoll
480	100	three	60	RussellStoll

* In addition to those shown on figure 5-1.

5.6.2 ILLUMINATION. Illumination is provided by a variety of flush-mounted ceiling fluorescent light fixtures. Wall-mounted, self-charging, battery-powered emergency lighting units are strategically located throughout the building. Each unit has either one or two bulbs and will turn on automatically during an ac power failure.

5.6.3 GROUNDING SYSTEMS. Building M7-1061 has an instrumentation and structural grounding system consisting of grounding rods interconnected by 4/0 copper wire to the existing Building M7-1061 grounding system.

5.6.4 LIGHTNING PROTECTION. Lightning protection is provided for the antenna tower by means of a lightning rod connected to the common grounding system.

5.6.5 BACK-UP POWER. Provisions have been made for back-up power to be supplied by a government-furnished diesel generator through an automatic transfer switch located on the southeast exterior wall of payload control room 134. This back-up system will supply power to the lights and receptacles in the payload control rooms.

SECTION VI

COMMUNICATIONS AND DATA HANDLING

6.1 COMMUNICATIONS

The SAEF-2 and Building M7-1061 (SAEF-2 control) areas are serviced by administrative and operational communications systems. These include the OIS-D, CCTV, administrative telephones, an internal public address (PA) system, and timing signals. Figures 6-1 and 6-2 indicate locations for these systems for the SAEF-2 and Building M7-1061 respectively.

6.1.1 OPERATIONAL INTERCOMMUNICATION SYSTEM DIGITAL. OIS-D is a multi-channel digital voice communication network interconnecting operational areas required for payload element processing at KSC with a capability to interface with the Transistorized Operational Phone System at Cape Canaveral Air Force Station (CCAFS).

6.1.2 CLOSED CIRCUIT TELEVISION. CCTV provides closed-circuit video surveillance and recording of payload processing from operational areas to control and monitor areas in SAEF-2 and Building M7-1061, the remote control area. There are five Sub-Sea Model PTS-6 pan and tilt CCTV cameras in the facility; three fixed and two portable. These cameras are hazardproof. Areas under the surveillance of CCTV cameras include rooms 101 and 102 in the SAEF-2.

A 48.3 cm (19 in) video cable termination bay has been provided in room 114 of M7-1061 as well as in terminal room 132 of the M7-1061 addition.

6.1.3 OTHER COMMUNICATIONS. Other forms of communication located in SAEF-2 and Building M7-1061 include administrative telephones located in the CWA complex, test cell, office trailers, office areas, payload control rooms, and other operational areas; an internal PA system with an aural warning device in the CWA complex, office areas, Building M7-1061 office areas and payload control rooms, and range timing. There are four countdown clocks in SAEF-2: one on the south wall of room 106, one on the east wall of room 102 (high bay), and two on the west wall of room 118 (test cell). There are two countdown displays in each payload control room of Building M7-1061.

6.2 DATA HANDLING

The following data handling systems are available in the SAEF-2 and Building M7-1061 for payload element processing requirements. The payload LSSM should be contacted for current data handling capabilities.

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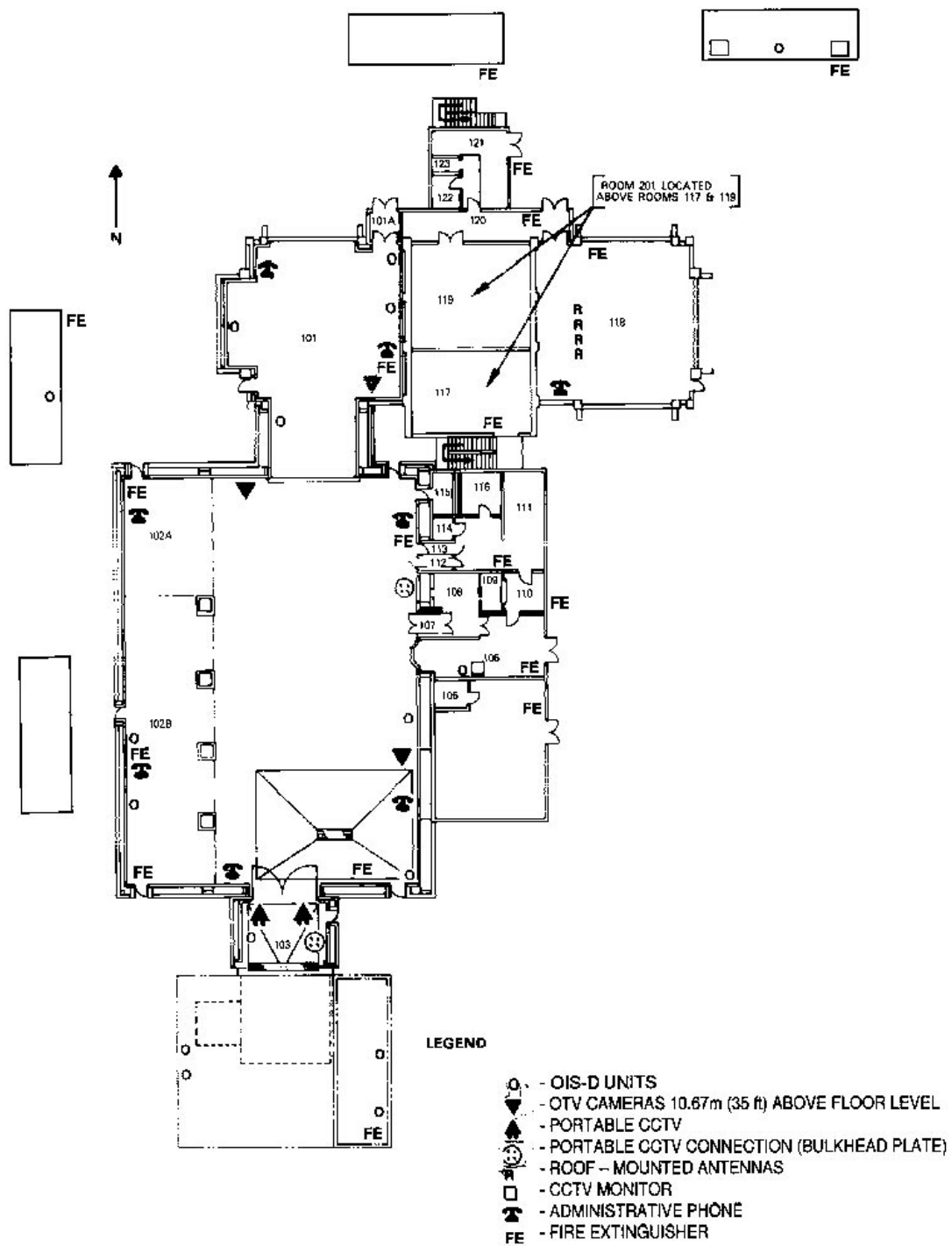


Figure 6-1. SAEF-2 Communications Systems

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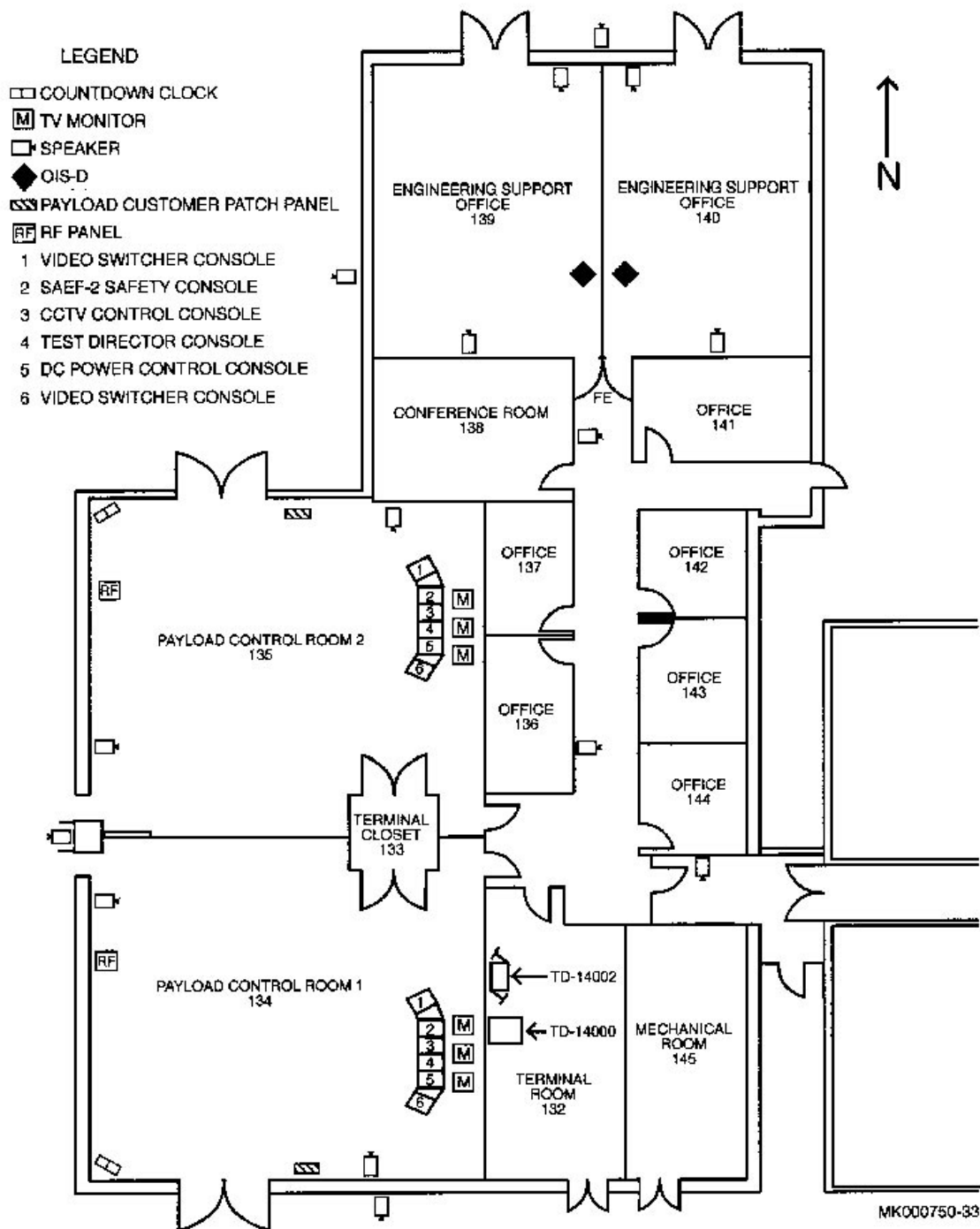


Figure 6-2. Building M7-1061 Communications Systems

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6.2.1 WIDEBAND CABLE TRANSMISSION SYSTEM (WBTS). The WBTS provides closed-circuit transmission of complex waveform electromagnetic signals within the 30-Hz to 4.5-megahertz (MHz) frequency spectrum at 1.0 Vp-p +/- 0.2V terminated into a 124 ohms balanced load. These signals include TV video information, Launch Processing System (LPS) data trains, high-density operational intercommunications, multiplex telecommunication carriers, timing distribution, and system and event command response display data. An Inter-range Instrumentation Group (IRIG) -B timing interface and an IRIG-E timing interface are located on the east wall of the high bay and in each payload control room. Also included are other analog and digital data associated with aerospace vehicular checkout, launch preparation, and postlanding equipment performance interrogations.

Wideband video frequency (30 Hz to 5 MHz) lines connect the SAEF-2 facility (room 119) and Building M7-1061. The WBTS is available in the remote payload control rooms in the M7-1061 addition to a patch rack in each payload control room. The SAEF-2-to-M7-1061 lines are 24 balanced Twinax of 124-ohm impedance, 40 balanced Twinax of 78-ohm impedance, and 20 radio frequency (RF) 11/G coaxial cables.

6.2.2 RERADIATING ANTENNA SYSTEM. There are eight vertically polarized antennas on the roof of the test cell (room 118) and eight similar antennas are located on a tower a short distance from the northeast corner of Building M7-1061. Two of the antennas are S-band (1.7 to 2.3 gigahertz (GHz)); two are X-band (7.1 to 8.4 GHz). The remaining four antennas are: one low C-band (3.7 to 4.2 GHz), one high C-band (5.9 to 6.4 GHz), one low Ku-band (11.7 to 12.2 GHz), and one high Ku-band (14.0 to 14.5 GHz). (This configuration is the same at both locations.) These antennas can be manually positioned on a mission-by-mission basis to interface with other KSC facilities and payload processing facilities on CCAFS. There are S-, C-, X-, and Ku-band coaxial cable and waveguides installed between the SAEF-2 and Building M7-1061 via the inter-building cable trench. See table 6-1 for RF capability for both locations. (Refer to KSC-HB-0004.0, Payload Antenna Repeater System User's Planning Guide, for additional information.)

Table 6-1. RF Capability for SAEF-2 and Building M7-1061

Band	Number of Links	Interface
C	2	LC-39A&B, VPF, AE, AM, AO
Ku	2	LC-39A&B, GMIL, VPF, AE, AM, AO
S	2	LC-39A&B, VPF, GMIL, S, AE, AM, AO, OPF
X	2	LC-39A&B, VPF, GMIL

6.2.3 AUDIO FREQUENCY CAPABILITY. There is an audio frequency cable from the facility to M7-1061. The SAEF-2-to-M7-1061 pairs are twisted 22 gauge with a 600-ohm nominal impedance at audio frequencies.

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SECTION VII**FACILITY DESCRIPTION SUMMARY, SAEF-2****7.1 SAFETY**

- a. Designated explosive safe area
- b. Restriction - determined by NASA safety on a payload to payload basis
- c. Exhaust system
- d. Waste fuel vent, oxidizer vent, Krypton 85 vent - high bay (room 102)

7.2 FLOOR SPACE

Facility	1556.08 m ² (16,750 ft ²) of usable floor space
a. Airlock (room 101)	17.68 m by 12.50 m (58 ft long by 41 ft wide)
b. High bay (room 102)	30.18 m by 14.94 m (99 ft long by 49 ft wide)
c. Low bay (room 102A)	8.23 m by 5.79 m (27 ft long by 19 ft wide)
d. Low bay (room 102B)	21.95 m by 5.79 m (72 ft long by 19 ft wide)
e. Test cell (room 118)	11.28 m by 11.28 m (37 ft long by 37 ft wide)
f. Remote payload control room and support areas (M7-1061 addition)	483.08 m ² (5200 ft ²)

7.3 CEILING HEIGHTS

a. Airlock (room 101)	15.85 m (52 ft)
b. High bay (room 102)	22.56 m (74 ft)
c. Low bay (room 102A)	13.26 m (43 ft 6 in)
d. Low bay (room 102B)	7.62 m (25 ft)
e. Test cell (room 118)	15.85 m (52 ft)

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7.4 EQUIPMENT ENTRY (CLEAR)

- | | |
|----------------------|---|
| a. Airlock | Vertical lift 6.55 m by 12.19 m (21.5 ft wide by 40 ft high) |
| b. High bay | Horizontal sliding 6.40 m by 12.04 m (21 ft wide by 39 ft 6 in high) |
| c. Test cell | Vertical lift 6.71 m by 12.19 m (22 ft wide by 40 ft high) [3 doors] |
| d. Oven area | 4.88 m by 3.66 m (16 ft wide by 12 ft high) |
| e. Equipment airlock | 1.35 m by 2.11 m (4 ft 5 in wide by 6 ft 11 in high) [clearance, outside double door] |

7.5 CRANES

- | | |
|--------------|---|
| a. Airlock | One 9.08 metric ton (10-ton) bridge crane |
| b. High bay | One 18.2 metric ton (20-ton) bridge crane |
| c. Test cell | One 9.08 metric ton (10-ton) bridge crane |

7.6 HOOK HEIGHTS

- | | |
|--------------|---------------------|
| a. Airlock | 13.72 m (45 ft) |
| b. High bay | 19.9 m (65 ft 5 in) |
| c. Test cell | 13.72 m (45 ft) |

7.7 SYSTEMS AND EQUIPMENT

- | | |
|-----------------------------------|---|
| a. Pneumatics | Compressed air at 6.21 and 10.34 bars (90 and 150 psig); 170 scfm nonregulated and 300 scfm nonregulated in CWA, airlock, and oven area |
| b. Vacuum system | CWA and airlock |
| c. Gaseous nitrogen | 17.24 bars (250 psig) maximum, CWA and airlock |
| d. Fuel and oxidizer waste drains | Rooms 102 and 103 |
| e. Fire protection equipment | Automatic fire detection system with portable fire extinguishers and firehose; water deluge riser system installed |

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7.8 TEMPERATURE AND HUMIDITY

All operational areas 21.7 ± 3.3 °C (71 ± 6 °F)/50 percent or less

7.9 CLEANLINESS SPECIFICATIONS

- a. Airlock Class 300,000 CWA
- b. High bay Class 100,000 CWA
- c. East test cell Class 300,000 CWA

7.10 ENVIRONMENTAL MONITORING SYSTEM

High bay and airlock (fixed); portable sensors and recorders

7.11 ELECTRICAL POWER

- a. Airlock 120 V ac/20, 30 A/1 phase
- b. High bay 120/208 V ac/30, 100 A/3 phase
120 V ac/20, 30 A/1 phase
480 V ac/100 A/3 phase
480 V ac/200 A/3 phase
- c. Oven area 120 V ac/20, 30 A/1 phase
- d. Test cell 120 V ac/30 A/1 phase
120/208 V ac/30 A/3 phase
480 V ac/60 A/3 phase
277/480 V ac/100 A/3 phase

7.12 ILLUMINATION

- a. All operational areas Over 592.02 lm/m² (55 foot candle (f-c))
- b. Room 118 753.48 lm/m² (70 f-c) with metal halide lamps

7.13 COMMUNICATIONS

- a. CCTV
 - (1) Surveillance areas Rooms 101 and 102
 - (2) Monitor areas SAEF-2 Room 106 and M7-1061
- b. Telephones - administrative Commercial telephone service
- c. OIS-D Transmit and receive from LC-39 and KSC Industrial Area

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d. Public address All SAEF-2 operational areas. Aural warning device overriding microphone input. Paging and area warning system in all operational and support areas.

e. Countdown clocks Rooms 102, 106, and 118

7.14 DATA HANDLING

a. Wideband Cable Transmission System

(1) Frequency 30 Hz to 4.5 MHz

(2) Capability TV video, telemetry, data display, LPS data, high density, OIS-D, automated payload checkout and surveillance monitoring information, multiplex telecommunications carriers, timing distribution (IRIG-B and IRIG-E), system and event command, and response display data

- Uplink and downlink RF OIS-D
- CCTV
- Payload command data
- Payload telemetry
- ESS CCTV and data
- SAEF-2-to Communication Distribution and Switching Center maintenance

b. Radiating system C-band to LC-39A&B, GMIL, VPF, AE, AM, AO, M7-1061
Ku-band to LC-39A&B, GMIL, VPF, AE, AM, AO, M7-1061
S-band to LC-39A&B, VPF, GMIL, S, AE, AM, AO, M7-1061, OPF
X-band to LC-39A&B, VPF, GMIL, M7-1061

c. Audio system An audio cable to Building M7-1061

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45 SPW/SEM	L. BAILEY	
AC-PRO	N. TALLUTO	
BGC-323	S. MCGOVERN	
CP-FGO	E. KIRKLAND	
CP-PSO	K. MEASE	
CP-PSO-A	M. WHITNEY	25
CS-GSD-11B	D. WADE	
CS-PPD-1	M. CARDONE	
DE-PMO-3	H. HILTON	
DE-PMO-3	W. STAMPLEY	
DE-PMO-5	H. PEETE	
DF-ESD-2	B. NELSON	
DF-ESD-2A	W. GLUSING	
FORMS WAREHOUSE		30
JPL-AO/CCAFS	S. BERGSTROM	2
LIBRARY-D	KSC LIB DOCS	2
LMSC-ASRM	J. LINDBERG	
LSO-038	LIBRARY	
MD	P. BUCHANAN	
MDSS-KSC-F154	D. TAGUE	
MDSS-KSC-F200	J. SCHOFIELD	
MDSS-KSC-F202	F. BONGIORNO	
MDSS-KSC-F210	R. SHANE	
MDSS-KSC-F248	G. D'HEILLY	
MDSS-KSC-F252	L. DERBY	10
MDSS-KSC-F460	P. SECCURO	
MDSS-KSC-F620	D. CROOKER	2
MDSS-KSC-F658	TDC LIBRARY	
MDSS-KSC-F672	J. PASTER	
MMC-AF	E. O'CONNOR	
RO-PAY	C. ZIMMERMAN	
SI-PEI-2	A. KOHN	
TP-POD	LIBRARY	
LERC-60-3	L. JOYCE	
SPACEHAB		
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620 MAGELLAN RD.		
CAPE CANAVERAL, FL 32920		

TOTAL

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SYSTEM PROBLEMS/PERFORMANCE--KSC Documents Library, LIBRARY-D, 7-9601/3613

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